Neonatal Pain: Theory and Concepts
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Abstract
Pain assessment and management in the neonatal population is an ongoing area of controversy and debate. Historically a lack of knowledge and understanding of neonatal pain has hindered the development of comprehensive pain management strategies in the clinical area. The rights of the child to appropriate pain relief regardless of the environment is paramount, however most pain interventions are of uncertain efficacy and are associated with both risk and cost. This paper examines current literature on the theory and concepts associated with neonatal pain. The first section will review evidence on the deleterious effect of pain on the neonate. The second section considers to what extent existing evidence had influenced neonatal pain assessment, reviewing the strategies utilised to assess pain within this specialised population.

Introduction
Debate on the management of neonatal pain has evolved over the past three decades. The initial widespread belief that neonates lack complete development of the neuroanatomical and neuroendocrine components necessary to perceive pain, accompanied by concerns over the potentially deleterious effects of analgesia on the respiratory system (Lippmann et al. 1976, Rackow et al. 1961) informed clinical practice at that time, with neonates receiving inadequate or no analgesia for painful procedures.

Aera of research in the 1980’s established that neonates did demonstrate similar or exaggerated physiological and hormonal responses to pain (Anand and Hickey 1987), highlighting that exposure to pain may increase neonatal morbidity (Anand et al. 1987). It is now acknowledged that neonates experience pain to a similar extent or possibly more intensely than older children and adults and are at risk of adverse long term behavioural and developmental effects due to inadequate management of pain relief in the newborn period (Mathew and Mathew 2003). However regardless of these views it is still reported that pain is: “...underestimated and under treated in children and particularly babies. There is still evidence that pain is inadequately dealt with for children, requiring better prevention, assessment and treatment”. (Department of Health, Department for Education and Skills 2007)

Furthermore the intense debate over the dosage of analgesia as well as the risks and benefits of different pain management techniques within the neonatal population continue within the literature (Anand et al. 2004).

Effects of Pain on the Neonate
The short and long-term effect of pain on the term and preterm neonate is a complex area of discussion. The increasing number of surviving extremely low birth weight and medically fragile neonates has introduced a new population into the Neonatal Intensive Care Unit (NICU) who potentially can be hospitalised for lengthy periods (Grunau and Tu 2007). It has also been suggested that due to the plasticity of the developing nervous system, the greatest impact of pain may occur in the most immature and sick neonate (Fitzgerald 2005). Within the NICU environment neonates are frequently exposed to repeated stressful and nociceptive stimulation which can lead to sensitization (Grunau and Tu 2007), with excessive or abnormal neural activity related to pain and injury during the postnatal period also being linked to long-term changes in somatosensory and pain processing (Anand 2000). Procedural pain can induce changes in physiological, behavioural and hormonal response which could influence nociceptive and tactile thresholds, neurodevelopment, stress physiology and behaviour (Anand 2000). There is also a growing body of evidence which suggests a potential link between pain in preterm neonates (particularly extreme preterm) to later development and behavioural compromise in preterm children (Grunau and Tu 2007). Furthermore Anderson et al. (2004) highlight a correlation between problems in cognitive and behavioural function and birth weight and gestational age. It has also been suggested that the intensity of pain experienced by the neonate in the NICU is another important factor in neurodevelopmental outcome (Grunau and Tu 2007).

Differentiation between Pain and Stress in the Neonate
The terms “neonatal pain” and “neonatal stress” frequently interlink in the literature. The fact that the neonate cannot report pain presents challenges in the assessment and management of both stress and pain in the neonatal period (Johnston et al. 1997). Stress has been defined as:
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“a physical, chemical, or emotional factor that cause’s bodily or mental tension and may be a factor in disease causation” (McGraw 1996).

Stress responses can be specific to a particular source or nonspecific and generalised. McIntosh et al. (1993) reflected that pain is dependent on the three main factors: the pain stimulus, the individual’s response to the pain stimulus and the environment. Thus, stress responses are highly variable, and while stressful situations are necessary, they are not always harmful. In some cases, stress responses can be beneficial, as they can help individuals to cope with stressful situations. However, when stress responses are prolonged or excessive, they can lead to negative outcomes. For example, prolonged stress responses can lead to physical and mental health problems, such as cardiovascular disease, depression, and anxiety.

The Assessment of Neonatal Pain: Theory to Practice

Neonatal pain is a complex and multifaceted phenomenon that can be influenced by a variety of factors, both internal and external. Nurses play a crucial role in the assessment and management of neonatal pain, and they need to be equipped with the knowledge and skills to do so effectively. However, the assessment of neonatal pain can be challenging due to a lack of validated tools and the need for consistency in definitions and terminology. Nurses must be familiar with the different approaches to pain assessment, as well as the limitations and potential sources of error in each method. By understanding the different factors that contribute to neonatal pain, nurses can better assess and manage it, ultimately improving the overall health and well-being of neonates.
of available scales, all of the assessment related problems in neonates have not been solved. Duhn and Medves (2004) highlight that most scales have been validated for the acute, procedural setting and perform less well for sub-acute or chronic pain.

Thewissen and Allegra (2011) argue that most scales do not take into account persistent pain which results in a quiet immobile neonate and also the limited capacity of the preterm neonate to mount a consistent and persistent behavioural and physiological response to pain. However newly evolving scales such as the N-PASS pain and sedation scale (hummel et al. 2008) is an example of a scale which encompasses both pain and sedation with inclusion of the inactive and preterm neonate.

The validation and implementation of a pain scale may be based on intra and inter individual variability, with correlations being made with neuroendocrine markers of pain and stress (fitzgerald and Walker 2009). However it has been highlighted by Thewissen and Allegra (2011) that interrater agreement is only reflective of agreement in rating between different caregivers and excludes a systematic error. It has been suggested that pain assessment scales focus on aspects of pain expression which does not necessarily reflect nociception (fitzgerald and Walker 2009).

A further aspect presented by Xavier Balda et al. (2000) is that health professionals under assess infant pain as a coping strategy, reflecting that this occurs during times when health professionals are put in a position when they need to cause varying degrees of pain and discomfort to the neonate as part of their daily job. Reyes (2003) expand on this view by highlighting the importance of nurses’ appropriate assessment and subsequent documentation of pain. Frequently pain assessment scales are modified and adapted to particular clinical areas where they will be used, however modification of assessment scales application in a new population or environment may interfere with psychometric testing and may necessitate repeat testing (duhn and medves 2004). The issue of clinical utility is important as it has to be appropriate for use in the clinical setting. Scales which are complex, lengthy and require extensive training may not be feasible or practical in the clinical setting. It is important to ascertain if the scale or measure has been developed for research or clinical purposes and the population within which the scale has been developed (steiner and norman 2006).

**Conclusion**

This Paper provides an overview of the complex issues surrounding neonatal pain and the extreme difficulties in assessing pain in this group of patients. The treatment of pain in neonates stimulates debate around ethical issues, health policy frameworks and clinical practice. The rights of the neonate to appropriate pain relief regardless of the circumstances or environment is paramount. However some pain interventions within this population are of uncertain efficacy, fuelling controversy in relation to assessing risk and benefit.

Despite a plethora of literature on the detrimental effects of neonatal pain accompanied by clear agreement that neonates experience pain, there continues to be reports of inadequate assessment of pain in the clinical area and underuse of pain assessment strategies. The reasons speculated for this range from difficulties in the application of some pain scales to the clinical area, challenges in differentiating pain and stress, lack of education or training. This provides challenges for future research and clinical practice to develop safe and effective strategies in pain management within this vulnerable population, accompanied by effective education programmes.

References


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